

**A-1 URBAN WATER CONSERVATION GRANT APPLICATION
COVER SHEET**

1. Applicant (Organization or affiliation): Regional Water Authority
2. Project Title: ET Controllers for Large Landscape Sites Installation Program
3. Person authorized to sign and submit proposal:
- | | |
|------------------------|---|
| Name, Title | Edward Winkler, Executive Director |
| Mailing address | 5620 Birdcage Street, Suite 180, Citrus Heights, CA 95610 |
| Telephone | 916-967-7692 |
| Fax | 916-967-7322 |
| E-mail | ewinkler@rwah2o.org |
4. Contact person (if different):
- | | |
|------------------------|---|
| Name, Title | Charlie Pike, Regional Water Efficiency Manager |
| Mailing address | 5620 Birdcage Street, Suite 180, Citrus Heights, CA 95610 |
| Telephone | 916-967-7692 |
| Fax | 916-967-7322 |
| E-mail | cpike@rwah2o.org |
5. Funds requested (dollar amount): \$1,657,900
6. Applicant funds pledged (local cost share) (dollar amount): \$87,000
7. Total project costs to DWR and Participating Agencies (dollar amount): \$1,744,900
8. Estimated net water savings (acre-feet/year): 444
- Estimated total amount of water to be saved (acre-feet) over 10 years (project life): 13,316
- Benefit/cost ratio of project for applicant: 1.1
- Estimated average \$/acre-feet of water to be saved: \$137/AF
9. Project life (month/year to month/year): 10/03 – 12/06
10. State Assembly District where the project is to be conducted: 4, 5, 9 and 10
11. State Senate District where the project is to be conducted: 1, 4, 5 and 6
12. Congressional District(s) where the project is to be conducted: 3, 4, 5
13. County where the project is to be conducted: El Dorado, Sacramento and Placer County
14. Do the actions in this application involve physical changes in land use, or potential future changes in land use?
- (a) Yes
- (b) No No

A-2 APPLICATION SIGNATURE PAGE

By signing below, the official declares the following:

The truthfulness of all representations in the application;

The individual signing the form is authorized to submit the application on behalf of the applicant;

The individual signing the form read and understood the conflict of interest and confidentiality section and waives any and all rights to privacy and confidentiality of the application on behalf of the applicant; and

The applicant will comply with all terms and conditions identified in this Application Package if selected for funding.



Signature

Edward D. Winkler, Executive Director

Name and Title

12/1/02

Date

A-3 APPLICATION CHECKLIST

Part A: Project Description, Organizational, Financial and Legal Information

- ☒ A-1 Urban Water Conservation Grant Application Cover Sheet
- ☒ A-2 Application Signature Page
- ☒ A-3 Application Checklist
- ☒ A-4 Description of Project
- ☒ A-5 Maps
- ☒ A-6 Statement of work, schedule
- ☒ A-7 Monitoring and evaluation
- ☒ A-8 Qualification of applicant and cooperators
- ☒ A-9 Innovation
- ☒ A-10 Agency authority
- ☒ A-11 Operation and maintenance (O&M)

Part B: Engineering and Hydrologic Feasibility (construction projects only)

- ☒ B-1 Certification statement
- ☒ B-2 Project reports and previous studies
- ☐ B-3 Preliminary project plans and specifications
- ☒ B-4 Construction inspection plan

Part C: Plan for Environmental Documentation and Permitting

- ☐ C-1 CEQA/NEPA
- ☐ C-2 Permits, easements, licenses, acquisitions, and certifications
- ☐ C-3 Local land use plans
- ☐ C-4 Applicable legal requirements

Part D: Need for Project and Community Involvement

- ☒ D-1 Need for project
- ☒ D-2 Outreach, community involvement, support, opposition

Part E: Water Use Efficiency Improvements and Other Benefits

- ☒ E-1 Water use efficiency improvements
- ☒ E-2 Other project benefits

Part F: Economic Justification, Benefits to Costs Analysis

- ☒ F-1 Net water savings
- ☒ F-2 Project budget and budget justification
- ☒ F-3 Economic efficiency

Appendix A: Reports from Completed Landscape Audits

Appendix B: Project Managers Resumes

Appendix C: External Cooperator Commitment Letters

Appendix D: ET Controller Equipment Specifications

Appendix E: Cost Estimate for ET Controller Retrofits

Appendix F: Data Reports and Case Studies

Appendix G: Background Information for Assumptions

Appendix H: Letter of Support – Sacramento Water Forum

Appendix I: Economic Uncertainty Analysis Results

A-4 DESCRIPTION OF PROJECT

The project consists of installing irrigation evapotranspiration (ET) based controllers through retrofitting parks, schools, or homeowner association (HOA) landscaped areas within the metropolitan region of Sacramento, California. This project will be regionally administered through the Regional Water Authority (RWA) in Sacramento, California to install thirty three (33) ET controller systems for large landscape sites.

The efficient use of California's limited water supplies is a critical local, regional, and statewide water issue. RWA assists 18 member water suppliers serving more 756,000 acre- feet of water per year to more than 1.2 million people. These retail water suppliers utilize both surface water from the Sacramento River and American River and groundwater as part of their water supply. This project will build upon Sacramento Water Forum Agreement commitments by participating agencies to conduct BMP 5, Commercial Institutional and Industrial (CII) and Multi-family Account Surveys by providing funding for purchase and installation of ET controllers.

This project is a regional expansion of the pilot project implemented by the City of Roseville, which installed ET controllers on 5 park sites in 1995. Eleven (11) retail agencies will participate in this program as external cooperators with a minimum of 3 sites within their respective service areas proposed to receive ET controllers. This project will leverage the United States Bureau of Reclamation partially funded park irrigation system audits conducted in 2002 (see Appendix A) by targeting the sites with documented overwatering. These sites will be priority targets to receive ET controllers.

The participating agencies have collectively committed to conduct a minimum of 20 more landscape surveys in 2004 and 2005. Funding from this proposal will provide for the installation of ET controllers. The criteria for receiving an ET controller will require a baseline water audit performed to establish water use for the site prior to installation and metering to allow quantification of water savings post retrofit. Other recommended system upgrades (piping, sprinkler heads, valves, conversion to drip irrigation) would be implemented with other funding sources such as parks, school districts or HOAs. These sources may match potential funds from Prop 13 Large Landscape Incentive Program granted in 2002 and requested in this round of grant solicitations.

External cooperating water agencies for this project are:

Citrus Heights Water District
City of Folsom
City of Lincoln
City of Roseville
City of Sacramento
County of Sacramento
El Dorado Irrigation District
Fair Oaks Water District
Placer County Water Agency
Sacramento Suburban Water District
San Juan Water District

The project cost estimate is \$1,745,000 including local agencies' contribution. The total proposed grant amount is \$1,657,900. This project can be considered scalable but not separable as described

in Section A.6.3 of the application. As described further in Section F, this project will result in total annual average net water savings of **444 ac-ft/year**, or **13,316 ac-ft per 10-year useful project life** with a favorable benefit cost ratio of **1.1**. The benefits-cost summary tables are presented in Section F-3.

A-5 MAP

Figure 1 depicts the location of water sources of supply and service areas of RWA member agencies. Figure 2 and 3 present the service area boundaries for Placer County Water Agency and El Dorado Irrigation District, respectively. Figure 4 illustrates the USGS topographical vicinity map for the regional area.

A-6 STATEMENT OF WORK, SCHEDULE

This section describes the nature, scope, and objectives of the project.

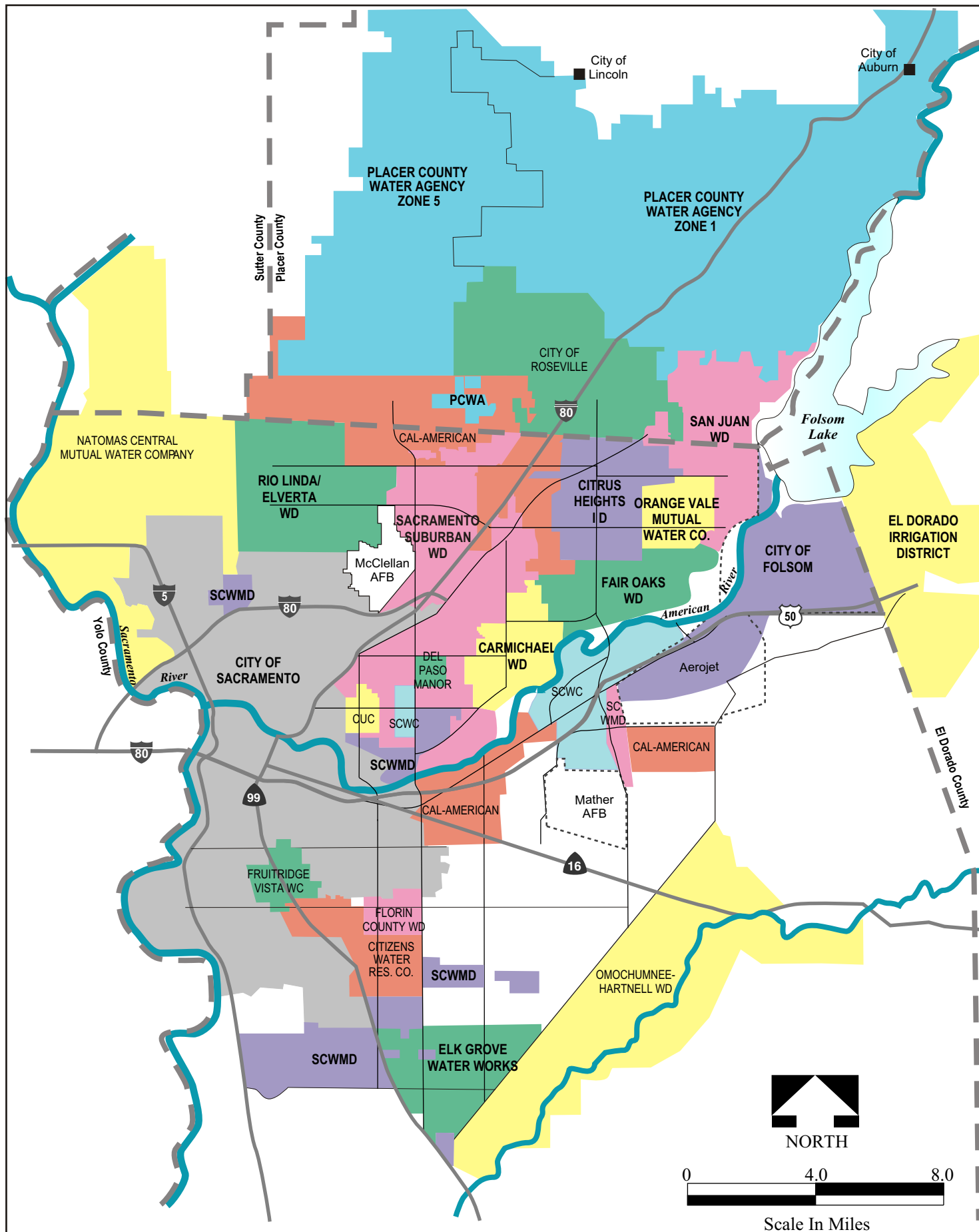
A.6.1 Nature, Scope, and Objectives of the Project

The overall goal of this project is the reduction of consumptive water use for irrigating landscaped areas within the Sacramento region. Although this program is designed to target large landscaped areas, any site will be eligible with landscaped area more than 5 acres that possesses an automatic irrigation controller that is not evapotranspiration (ET) based. The top water using CII accounts of water consumers will be targeted for surveys and ET controller installation.

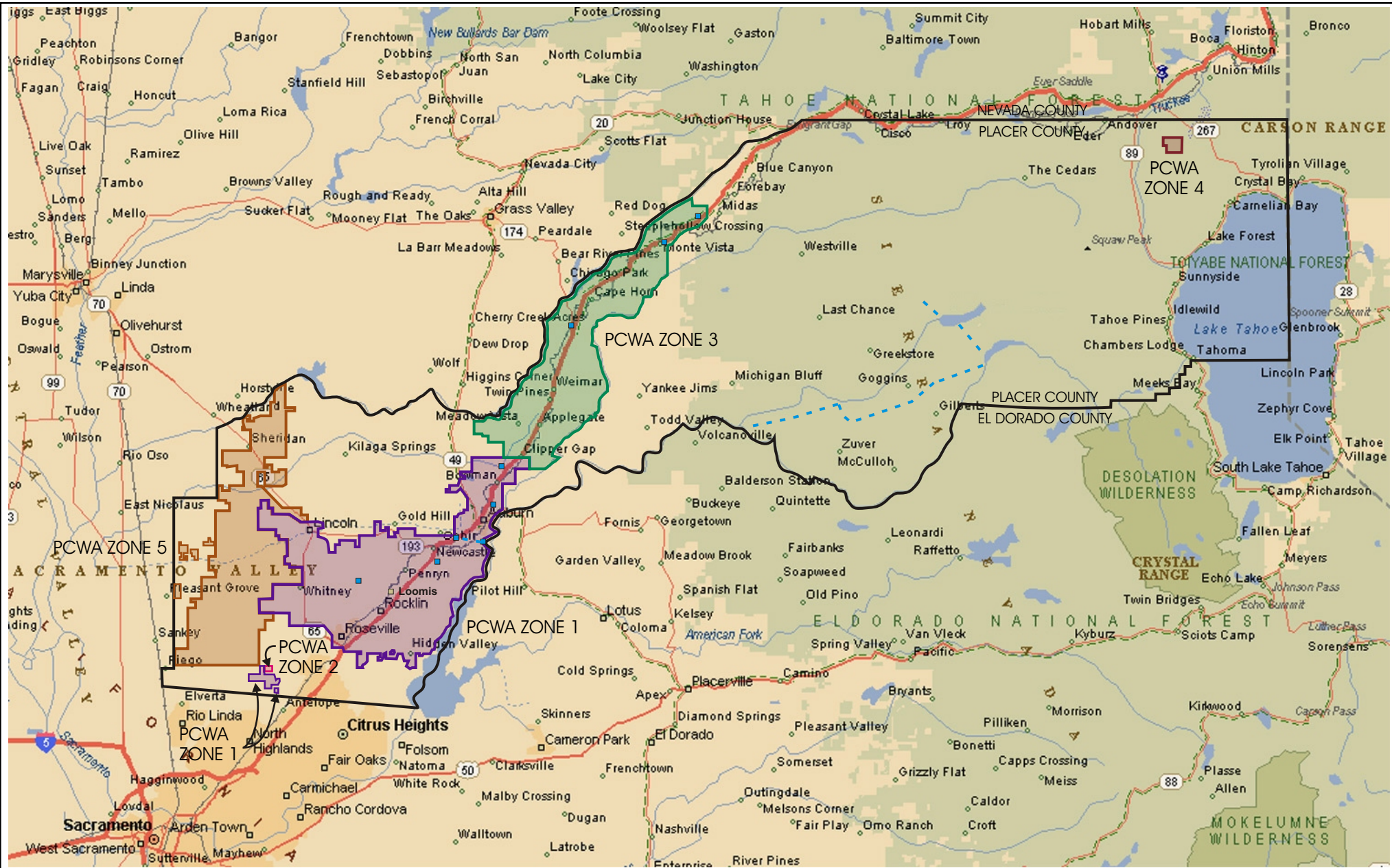
The objective of this project is to install an ET controller for large landscape sites that have performed an audit which recommends an ET controller by showing more than 25% water savings for the existing irrigation system. The site audit program will be funded by local agencies, but these agency has no provisions to fund the purchase of the ET controllers. The goal of this project is fund the cost of: site controllers, the communication system to the with the central ET controller, and the central ET controller. This project will allow for optimal irrigation system management. With these incentives provided through the water utility site owners will be more inclined to install the controllers and quickly implement upgrades for their automatic irrigation systems that were recommended during the site audits.

The installation program will be regionally administered through RWA providing all administrative duties associated with the grant from DWR and the retail agencies covering the administrative costs of providing the installation for the customer. RWA will administer bulk purchase of controllers and contractor installation costs over the three-year project time frame. .

Work for this project will be conducted by a competitively bid contractor and/or in-house park/school district landscape maintenance staff. This project will not include contracting out the regional administration of the grant, unless retail agencies specifically request the additional assistance in lieu of receiving administrative funding.

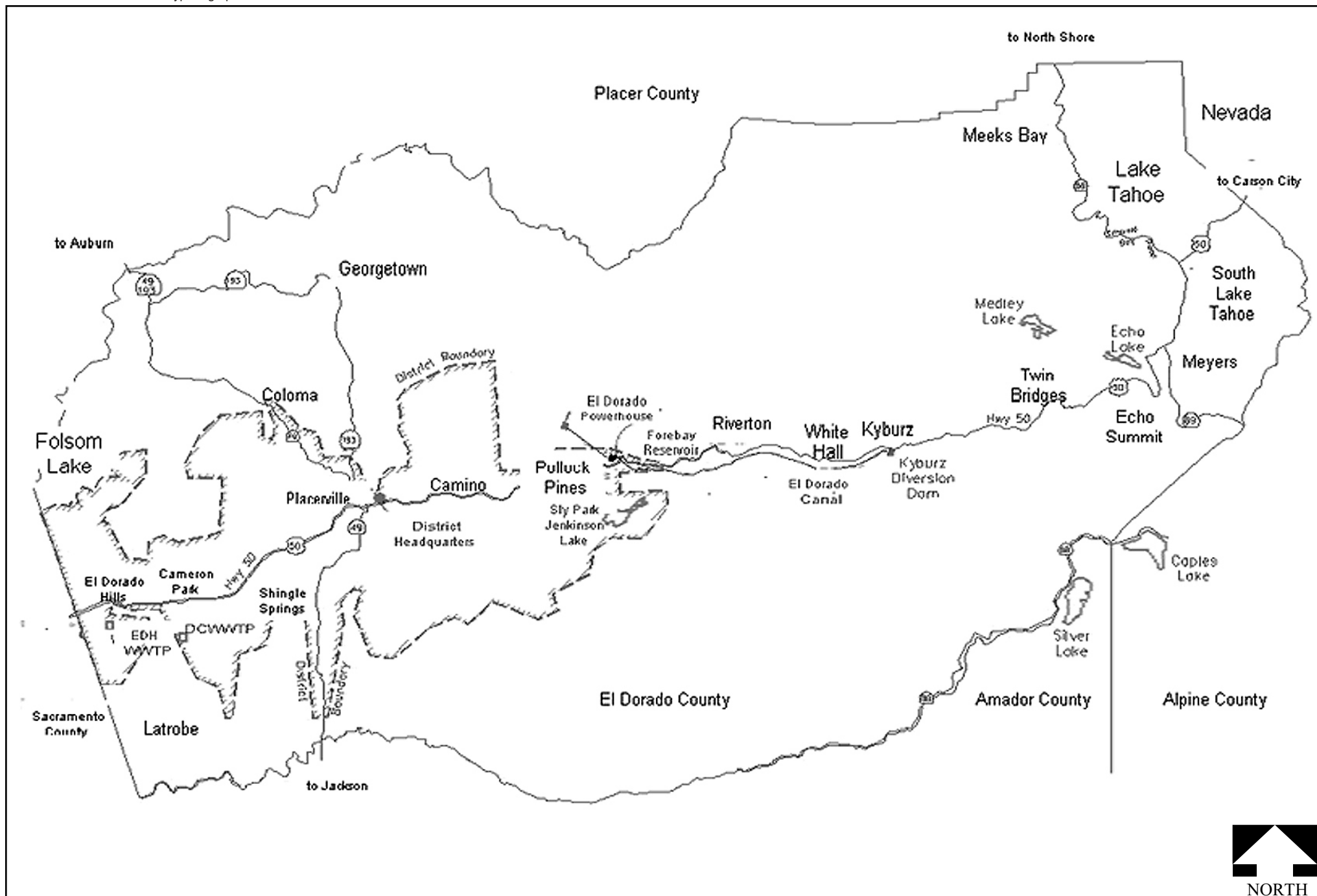


DATE	12-2-02	PROJECT	23546	SITE	DWR WUE Grant Application	FIGURE
B R O W N A N D C A L D W E L L				TITLE		
				Sacramento Regional Area Water Suppliers		1

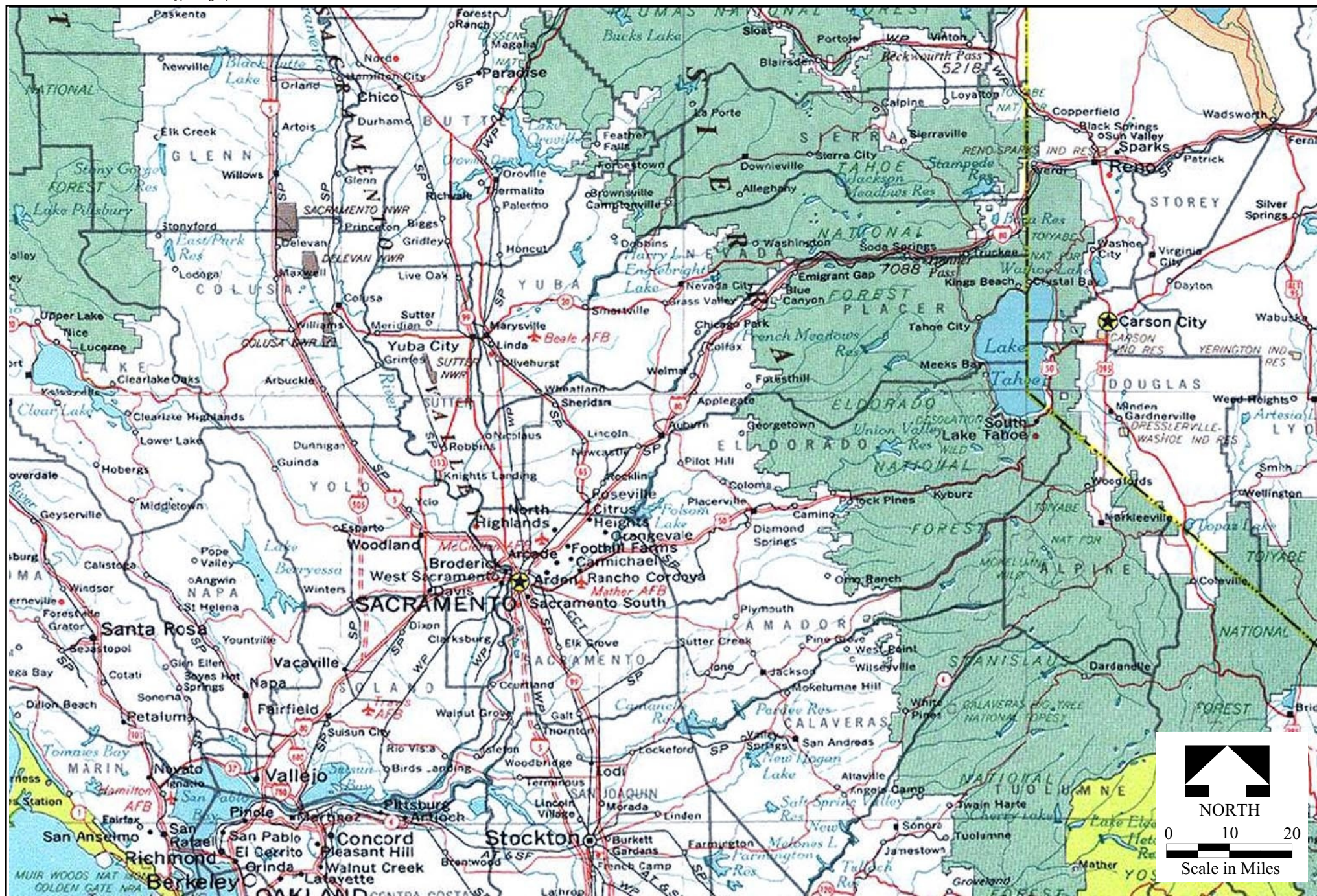


Source: Microsoft Trip Planner 98

B R O W N A N D C A L D W E L L	DATE	12-2-02	DWR WUE Grant Application Placer County Water Agency Service Area Map	FIGURE 2
	PROJECT	23546		



B R O W N A N D C A L D W E L L	DATE	12-2-02	DWR WUE Grant Application	FIGURE 3
	PROJECT	23546	El Dorado Irrigation District Service Area Map	



B R O W N A N D C A L D W E L L	DATE	12-2-02	DWR WUE Grant Application		FIGURE 4
	PROJECT	23546	USGS Topographical Map for Vicinity of Sources of Supply and Service Areas of Sacramento Regional Participating Agencies		

A.6.2 Scope of Work: Technical/Scientific Merit, Feasibility, Monitoring and Assessment

This section describes the methods, procedures and facilities associated with the project. A task list and schedule and quarterly expenditure of the project are also included in this section.

Methods, Procedures, and Facilities

This project is a regional approach to purchase and install ET controllers to improve the efficiency of irrigation systems. The costs of the project primarily involve the park/school districts, business property owners, or HOA match share and RWA administrative costs to implement the three year program. A projected 33 installations will occur over the three-year period between October 2003 and October 2006, with project completion including final report submission in December 2006.

The scope of this project consists of ten primary steps to be performed by RWA in conjunction with the agency staff and close coordination with system installer (park or school district staff or approved contractor):

1. Begin process to upgrade controllers on sites with previous landscape surveys (such as provided in Appendix A or other audits performed to date).
2. Identify potential additional candidate sites by working with park/school staff and HOA landscape contractors with the goal of targeting the most probable sites for ET controllers through information such as:
 - size of landscaped area, age of existing controller,
 - groups of sites with the same irrigation management
 - geographic location of sites and potential of adding future sites to the ET central controller systems established by this funding.
 - other recent system improvements (least cost planning option to work on sites that are already being upgraded with other equipment besides the controller, e.g., new drip system for trees and shrubs); and
 - existing irrigation meter already installed that has been tracking irrigation history.
 - Sites managed by organization willing to provide technical maintenance.
3. Continue to perform landscape surveys on selected target sites.
4. Competitively bid and install selected ET controllers on automatic irrigation systems. WE
5. Create quarterly summary reports of activity levels for DWR invoices.
6. Perform monitoring through verifying installations with on-site review of equipment purchase receipt, irrigation map showing station locations and respective plant zones, and instruction manual with scheduling set-up.
7. Equipment manufacturers will train landscape personnel as an included service with the purchase of ET controllers by both Motorola and Rainbird.
8. Assess water saving results from new water meter readings compared to past irrigation metered data (if available), and complete final report to DWR.

RWA will use standard administrative procedures to implement this regional program. Due to the heterogeneity and liability with utility purchasing and installing irrigation system equipment on other district or customer's facilities, it is foreseen that the most economical and feasible means for the purchase and installation is to hire a contractor or use existing on-site landscape maintenance staff. Using staff that is already familiar and will have long-term responsibility for future system

maintenance is viewed by RWA to be the most advantageous for having systems installed as both a cost saving measure and also for the education of on-site staff. Manufacturers provide training with the purchase of their systems and long-term technical support for the equipment. It is important that this relationship be established from the time of equipment purchase through installation to allow for optimal efficient water management operations over the useful life of the system. Additionally, as coordination will be conducted by RWA, separate participating agencies will not be required to use their standard purchasing and contracting procedures.

For this project, RWA will have a formal written agreement with the participating utilities and park/school districts and/or customers, as appropriate. RWA will have one designated project manager and each member agency will assign one designated program contact for the administration of the project within their service area. RWA project manager is responsible for the overall conduct of the project.

RWA project manager will be responsible for ensuring that each member agency fulfills its commitment to audit the landscaped area and verify implementation of the installation to qualified sites under the stipulations of RWA directed regional ET controller installation project guidelines. The guidelines will be developed during the 1st quarter of 2004 after DWR contract is executed. The retail water agency, alternatively RWA, or designated independent third party representative, will inspect installation recipients to ensure that ET controllers are installed on the irrigation systems, as indicated in this application and per the equipment purchase receipt prior to being submitted to DWR for reimbursement.

A.6.3 Task List and Schedule

The tasks for implementation of this project and the project schedule are described below and presented on Figure 5. The schedule includes deliverable items and projected due dates for each task. The schedule bar chart also identifies which tasks are considered to be inseparable if only a portion of the project is funded. The project may be considered scalable to the minimum number of 22 controllers (for approximately 2 installations per participating agency on average one per large site (approximately 25 acres) and one medium size site (approximately 15 acres)) before it's considered too administratively costly for implementation. RWA would be willing to commit to a maximum of 55 sites. Table A-1 presents a quarterly expenditure projections of DWR grant funds.

Tasks

1. Develop action plan per agency of a short-list of priority accounts to target based on metered data or other information. Site surveys are not considered a funded part of this project but are a necessary component to the work to be performed on retrofitted systems under this project.
2. Contact appropriate park/school district, and site owners to discuss possibilities for performing an on-site survey and ET controller installation.
3. Track number of surveys and status of implementation with documentation for ET controller installations (copies of irrigation maps and equipment purchase receipts, etc).
4. Inspect sites by RWA, and/or water agency staff, or other independent third party (e.g., California Conservation Corps) to verify contractor installation and accuracy of irrigation

map. Three copies of irrigation map will be required, one copy to be retain by water agency, one by site owner and one on location.

5. Complete Monitoring and Evaluation Report. This report will be written following the end of the project for submission to DWR regarding the total project outcomes. It will include summary results of the irrigation system surveys, ET controller systems installed, a summary the implementation protocol, and estimated water savings.

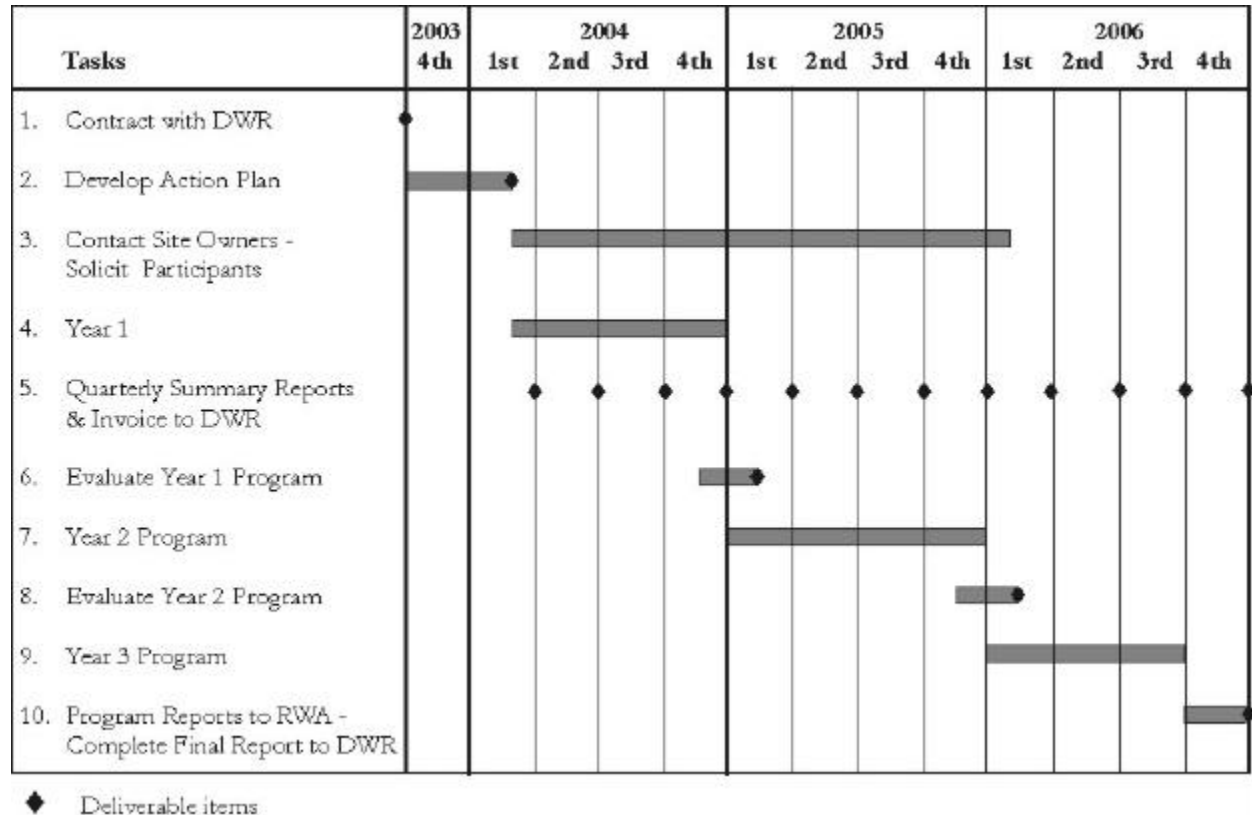


Figure 5. Project Timeline

Table A-1. Quarterly Expenditure Projection for DWR Matching Funds*

Quarter	Months	Activity	Expenditure
2003			
4	October-December	RWA-DWR Contract Administration	\$20,000
2004			
1	January-March	<i>Program Goal Year 1 = ET Controllers</i> RWA management Agreement with water suppliers; implementation, marketing, site selection begins	\$30,000
2	April-June	Application Processing, site inspection, customer system improvement	\$143,200
3	July-September	Continue marketing and site selection. Collect plans for selected sites. Request bids for ET controller systems.	\$143,200
4	October-December	Continue marketing and site selection. Install procured systems.	\$143,200
2005			
1	January-	<i>Program Goal Year 2 = 16 ET Controllers</i> Marketing & administration adjustments made. Install	\$195,000

	March	procured systems. Collect plans for selected sites. Request bids for ET controller systems.	
2	April-June	Continue marketing and site selection. Collect plans for selected sites.	\$195,000
3	July-September	Continue marketing and site selection. Collect plans for selected sites	\$195,000
4	October-December	Continue marketing and site selection. Collect plans for selected sites. Request bids for ET controller systems. Install procured systems.	\$195,000
2006		<i>Program Goal Year 3 = 8 ET Controllers</i>	
1	January-March	Continue marketing and site selection. Collect plans for selected sites. Install procured systems.	\$123,000
2	April-June	Collect plans for selected sites. Request bids for ET controller systems. Install procured systems	\$123,000
3	July-September	Install procured systems.	\$123,000
4	October – December	Resolve outstanding payments. Monitoring and Evaluation Report begins. Resolve outstanding payments. Final report to DWR.	\$29,300
Total			\$1,657,900

*Note: Costs within table do not include 10% contingency.

A-7 MONITORING AND EVALUATION

The key performance measure is the actual water savings that are realized as a result of this project. Overall water savings will be quantified based on the amount of avoided applied water to the landscape. The quantifiable savings due to ET based irrigation scheduling will be based on information collected during the on-site survey including but not limited to:

- amount of irrigable area to be determined at the time of the survey,
- existing conditions of the irrigation system,
- metered data, if available.

A list of project-specific performance measures that will be also be used to assess project success in relation to its goals is as follows:

- Quarterly summary reports will be prepared by RWA on behalf of each participating member agency. These summary reports will describe the current activities, number of controllers installed to date, and overall progress of the project including if the project is on schedule, which aids in project control. Each summary report will be submitted to DWR along with a quarterly invoice.
- Quarterly summary report copies will be distributed to all participating agencies for a regional project status update.
- One Final Report will be prepared by each member agency for submission to RWA for during 4th quarter 2006.
- A Monitoring and Evaluation Report will be prepared by RWA following project completion during 4th quarter 2006. This report will summarize the monitoring and evaluation both the before and after water use for the selected account data pre and post ET controller installation to the extent practicable.

The Quarterly Summary Reports and the Final Monitoring and Evaluation Report will be made available to the public at the RWA office. The information will be made available to the public through various outreach methods.

A-8 QUALIFICATIONS OF THE APPLICANT AND COOPERATORS

The qualifications of the project manager, cooperators, and partners to be involved in the financial incentive program for RWA are discussed in this section.

A.8.1 Resumes. The project manager primarily responsible for irrigation system incentive program will be Charlie Pike, the Regional Water Efficiency Manager. Mr. Pike's resume is included in Appendix B. Mr. Pike has 19 years of experience associated with administration of incentive programs. Mr. Tim Crowley, Water Management Coordinator, City of Folsom will be assisting Mr. Pike, along with other water conservation coordinators for all external cooperating agencies. Mr. Crowley's resume is also included Appendix B.

A.8.2 External Cooperators. Letters of commitment are provided in Appendix C.

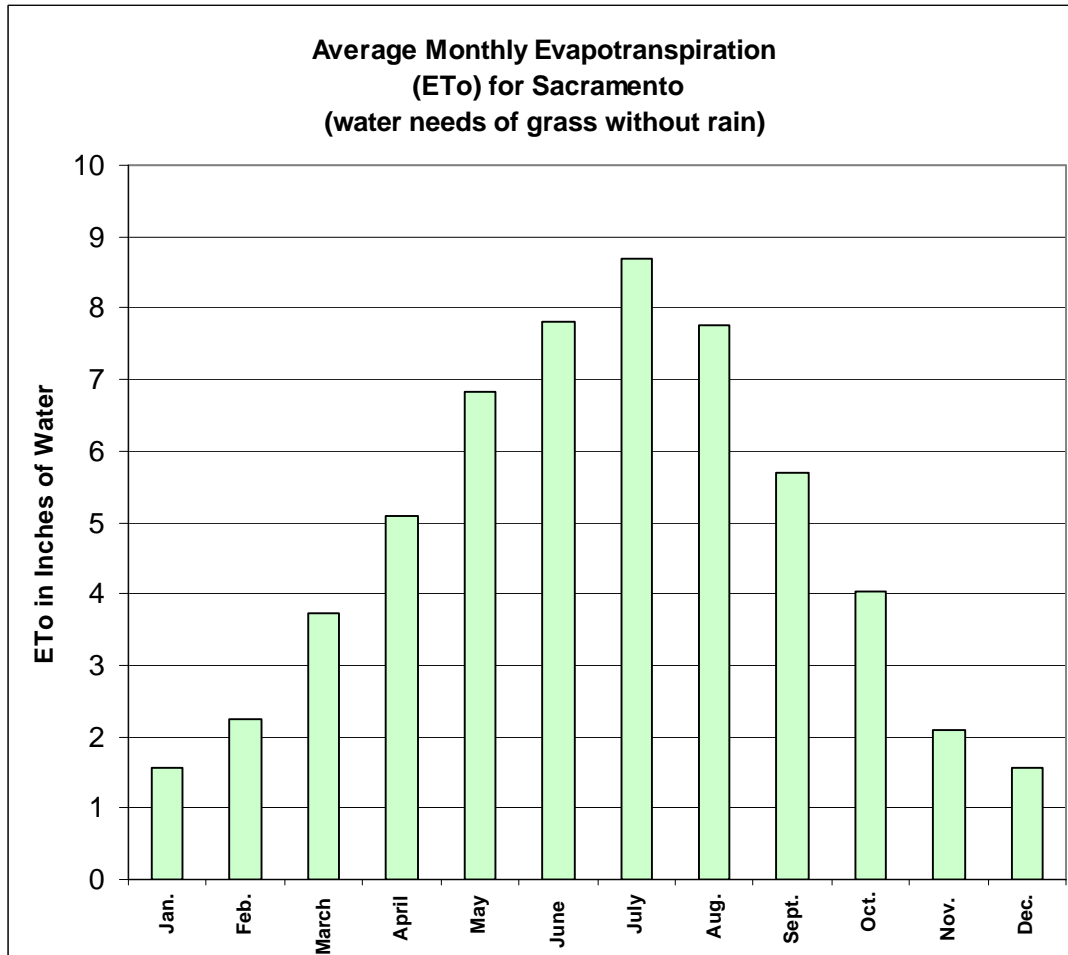
External cooperating water agencies for this project are:

Citrus Heights Water District
City of Folsom
City of Lincoln
City of Roseville
City of Sacramento
County of Sacramento
El Dorado Irrigation District
Fair Oaks Water District
Placer County Water Agency
Sacramento Suburban Water District
San Juan Water District

A-9 INNOVATION

ET controllers are a comparatively new irrigation technology being implemented in California beginning in the mid-1990s. The City of Roseville moved into the forefront of this technology by installing ET controllers at 5 park sites in 1995. The goal of this proposal is to extend this technology to large landscape sites located through out the regional Sacramento metropolitan area.

The Sacramento region experiences high summer ET rates, as illustrated in Figure 6, which translates into the installation of ET Controllers being economically feasible. Grant funding will allow for a regional -scale implementation of ET controller installation.



Source: Regional Water Authority from data by California Department of Water Resources, "California Irrigation Management Information System Reference Evapotranspiration, Station 131 Fair Oaks"

Figure 6. Monthly ET_o based on DWR CIMIS Data for Station 131, Fair Oaks

Innovation with these ET controllers is on-going with new products being released in the near-term future. The equipment specifications for the two primary manufacturers of ET controllers, Motorola and Rainbird, are provided in Appendix D. The project is cost effective with the installation of either of these models. The cost estimates for these models as provided by both Motorola and Rainbird are provided in Appendix E. The competitive bidding process for both the contractor installation and bulk purchase will determine the final product selection.

With proven beneficial implementation here in the City of Roseville and other selective areas, extension to other parts of California, particularly Northern California can investigate the value of their quantifiable water savings as a part of their water efficiency programs. This project can be valuable implementation experience of Best Management Practice (BMP) program, as it is not specifically defined within the *Memorandum of Understanding Regarding Urban Water Conservation in California* (MOU) list of standard fourteen Best Management Practices (BMPs).

The extension of regional collaboration to 33 large landscape sites will build the necessary backbone infrastructure to integrate future irrigation improvements into this network of ET controllers. An additional benefit will be the growing role of the RWA and all the participating agencies in providing a safe and reliable water supply for Sacramento area citizens. Additionally, it will expand the implementation of current BMPs focused on more efficient landscape irrigation. This project will be a valuable marketing tool to allow for more one-on-one contact with park, school districts and HOAs to open doors for participation in other programs, for example BMP 9 CII program as defined the Sacramento Water Forum Agreement (www.waterforum.org) and the CUWCC is being implemented by all participating agencies in this application.

The Sacramento region is one of the State's largest and has historically had relatively little attention to water use efficiency until the past few years. Increased visibility of the agencies with tangible water savings results and implementation "on the spot" with immediate installation of new water conservation devices will benefit the entire region and California.

This project will achieve near-term net water savings and will promote the market transformation to ET based irrigation controllers. They are currently expensive to implement on the scale of this project. Additionally, as market transformation to ET based controllers occurs, presumably unit costs will decrease making residential ET controllers more cost effective for customers and promotion by water agencies. The RWA perceives that sites with larger landscaped area, rather than residential landscapes should be the focus of the initial implementation of an ET controller retrofit program.

A-10 AGENCY AUTHORITY

Authority to Submit an Application and Enter Into a Funding Contract with the State

At their regular meeting on October 23, 2002, the Regional Water Authority Executive Committee authorized the Executive Director to enter into a contract to prepare applications for 2003 Proposition 13 Urban Water Conservation Grant Funds due on December 3, 2002. The Executive Director is authorized to sign the applications and submit application materials to for qualifying water suppliers. Each of the water suppliers participating in the grant applications have entered into an agreement with RWA to fund the applications and participate in the projects should they be funded. Should the application be funded, the Regional Water Authority will consider a separate resolution to enter into an agreement with the State to accept grant funds and implement the proposed project. The RWA has existing funding contracts with the State.

The Regional Water Authority ("RWA"), a joint exercise of powers authority formed under California Government Code section 6500 formed to serve and represent regional water supply interests and to assist its members in protecting and enhancing the reliability, availability, affordability and quality of water resources. The RWA has created the Regional Water Efficiency Program to assist water suppliers to meet the Best Management Practices for Urban Water Conservation. To this end the Regional Water Efficiency Program Activities includes projects to improve landscape irrigation efficiency.

The joint powers agreement ("RWA JPA") pursuant to which RWA was formed and operates, authorizes RWA to enter into a "Project or Program Agreement," which is defined in the RWA JPA

as an agreement between RWA and two or more of its Members or Contracting Entities to provide for carrying out a project or program that is within the authorized purposes of RWA, and sharing in the cost and benefits by the parties to the Project or Program Agreement.

Article 21 of the RWA JPA states: “The Regional Authority’s projects are intended to facilitate and coordinate the development, design, construction, rehabilitation, acquisition or financing of water-related facilities (including sharing in the cost of federal, State or local projects) on behalf of Members and/or Contracting Entities. The Regional Authority may undertake the development, design, construction, rehabilitation, acquisition or funding of all or any portion of such projects on behalf of Members and/or Contracting Entities in the manner and to the extent authorized by such Members and/or Contracting Entities as provided in this Agreement, but shall not accomplish these functions, nor acquire or own water-related facilities in its own name.”

RWA knows of no requirement that an election be conducted before entering into a funding contract with the State with respect to the proposed project.

RWA knows of no requirement that other government agencies review and/or approve a funding agreement between RWA and the State for the proposed project.

There is no impending litigation that may impact the financial condition of RWA, or its ability to complete the project. RWA has no water facilities.

A-11 OPERATIONS AND MAINTENANCE

RWA proposes to support the operation and maintenance of the ET controllers from that date of installation through life of the warranty provided by each respective manufacturer, which is included in the equipment specification information attached in Appendix D. The actual warranty details will depend on the selected bidder of ET controller, which may be Motorola, Rainbird, or other manufacturer source, as determined by RWA through the competitive bidding process for the equipment purchase. RWA will confirm at the time of RWA purchase from the selected bidder, that the warranty specifications conform to the DWR contractual requirements, if necessary and as applicable. The selected contractor will assume liability for correct installation and initial operation. The park/school district and/or other customer will be provided with appropriate manufacturer guidelines for operation and maintenance, product warranty information and will retain responsibility for ET controller operation and maintenance post installation.

PART B—ENGINEERING AND HYDROLOGIC FEASIBILITY

B-1 CERTIFICATION STATEMENT

I, Lisa Maddaus, a California registered civil engineer, have reviewed the information presented in support of this application. Based on this information, and any other knowledge I have regarding the proposed project, I find that it can be preliminarily designed to accomplish the purpose for which it is planned. The information I have reviewed to document this statement included:

- Available information on residential landscaped area within the respective RWA water supplier service areas.
- Equipment specifications from vendor catalogs and discussions with sales representatives.
- Avoided cost and other data as provided by RWA (Appendix G).
- Statement of Work, Schedule
- Budget Projections
- Economic Analysis



B-2 PROJECT REPORTS AND PREVIOUS STUDIES

There are three primary documents that serve as previous studies and project reports that are complimentary to the information presented in this application.

1. *City of Roseville Retrofit Data* – Although not formalized into report form the metered consumption data showing water savings of approximately 17% across 4 of the 5 park sites. A preliminary analysis of site specific metered consumption data, although not necessarily exclusive to the irrigation meter data as noted by winter water use levels, is presented in Appendix F. Below in Figure 7 is an example of the historical metered data for Royer Park in the City of Roseville. All of these park sites had a Motorola IrriNet Irrigation System installed in 1995. This project serves as a “pilot” program that RWA is looking to extend to the regional through grant funding.
2. *Motorola ET Controller System Case Study* – City of Calgary, Canada – installed the Motorola systems for their parks and a check of 13 sites showed a reduction of 44.3% on average. A copy of the Case Study is also provided in Appendix F.
3. *Avoided Cost of Water Supply* - The basis for the avoided cost assumptions discussed in Section F, the study of Project Costs and Benefits for the Sacramento Groundwater Authority’s DWR Groundwater Construction Grant Application submitted in December 2001. A copy of the justification for the avoided cost of alternative future water supply is provided in Appendix G.

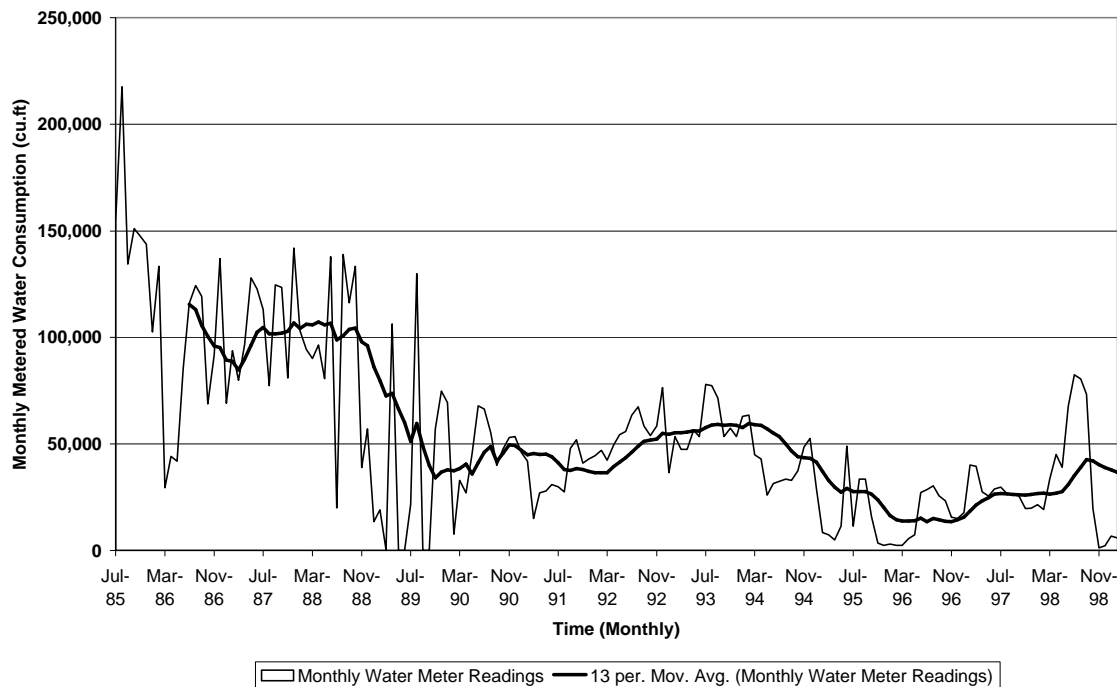


Figure 7. Historical Metered Data from Royer Park, City of Roseville with Motorola ET Controller Installed in 1995

B-3 PRELIMINARY PROJECT PLANS AND SPECIFICATIONS

Preliminary plans and specifications are not required under this project as proposed. Equipment specifications for two possible equipment manufacturers, Motorola IrriNet System and Rainbird Maxicom² System are provided in Appendix D.

B-4 CONSTRUCTION INSPECTION PLAN

Inspection Plan will consists of the following activities to be conducted by participating agencies:

- On-site inspection of each site by RWA, and/or water agency staff, or other independent third party (e.g., California Conservation Corps)
- Verification of contractor installation according to equipment purchase invoice
- Review of accuracy of Irrigation Map that is to illustrate the stations correlated with appropriate irrigated area. Three copies of Irrigation Map will be required, one copy to be retain by water agency, one by site owner and one on location.

The contractor will be inspected based on having completed the following activities:

Water Budget/Audit Checklist

Preparation:

- Contact park/school personnel
- Set appointment – checking for mow days, special event dates, school break times, recesses, etc.
- Schedule personnel
- Contact water agency for historical (last two years) water use consumption, water billing rates, how many meters on the site, and what size meters.
- Prepare forms and tools
- Staff requirement = One certified water auditor with 1 or 2 support technicians

On Site:

- Meet with park/school personnel
- Find meter(s) and irrigation controller(s)
- Measure complete site, recording turf, shrubs, trees, playgrounds, buildings, & hardscapes
- Check density
- Check microclimates
- Check root zones
- Check soil types
- Record water pressure and troubleshoot complete irrigation system
- Check meter to make sure it is working and take starting meter read
- Run sprinklers for 5 to 15 minutes to record station flow rate
- Take meter reads after each station run test
- Count and record the number of heads on each station
- Record the type of sprinklers in each station
- Place water audit cups, run sprinklers for sprinkler data, system uniformity, and losses estimate (runoff, leaks, and low head drainage). Record.

In office:

- Review finding from site
- Do area calculations
- Know effective rainfall for each month of year
- Estimate plant irrigation factors
- LWM data entry
- Figure irrigation flow rate per station per month
- Calculate maximum applied water allowance (MAWA)
- Calculate estimated applied water (EAW)
$$\text{plant water use} - \text{effective rainfall} = \text{irrigation efficiency}$$

- Do irrigation schedule on budget allowance
- Calculate the maximum applied water allowance (MAWA) and the estimated applied water budget (EAW)
- Check and compare with historical applied water use (AWU) supplied by water agency with the MAWA and then with the EAW
- Calculate a cost comparison between the AWU and MAWA
- Calculate a cost comparison between the AWU and EAW
- List recommendations for improvement to irrigation system and benefit of plant materials
- Write report entering all data information, listing the findings and recommendations, and provide information flyers (from retailers) on recommended new irrigation products.
- Send report to all involved agencies.

PART C—PLAN FOR COMPLETION OF ENVIRONMENTAL DOCUMENTATION AND PERMITTING REQUIREMENTS

C-1 CALIFORNIA ENVIRONMENTAL QUALITY ACT AND NATIONAL ENVIRONMENTAL POLICY ACT

CEQA/NEPA documentation is not applicable for this project, notice of exemption will be completed prior to contract execution between DWR and RWA.

C-2 PERMITS, EASEMENTS, LICENSES, ACQUISITIONS, AND CERTIFICATIONS

Not applicable.

C-3 LOCAL LAND USE PLANS

Not applicable. No proposed land use changes.

C-4 APPLICABLE LEGAL REQUIREMENTS

Not applicable.

PART D- NEED FOR PROJECT AND COMMUNITY INVOLVEMENT

D-1 NEED FOR THE PROJECT, RELEVANCE & IMPORTANCE

This section describes need for this project and a description of how this project is consistent with local and regional water management plans and other resource management plans.

In summary, the principal need for this project is founded in the following:

- The efficient use of California's limited water supplies is a critical local, regional, and statewide water issue. The Sacramento region historically has not focused on water use efficiency and has in the past several years undertaken water use efficiency programs with the newly formed Regional Water Authority.
- The water supply for the retail agencies participating in this project comes partially or wholly from the Sacramento River and/or American River in addition to local groundwater supplies. Decreased water withdrawals from the Sacramento and American Rivers directly increases Bay-Delta flows.
- This project will provide benefit to the Bay-Delta by ensuring that water diverted upstream is used efficiently. An important objective of the Water Forum Agreement is for signatory water suppliers to reduce diversions from the Lower American River during critical dry years, so that flows may be maintained for aquatic life.
- Grant funding assists to essentially "kick-start" this regional effort to enhance collaboration among water agencies that initiated their Water Forum commitments to water conservation programs in 2000 (although some were signatories to the CUWCC MOU prior to 2000). As many agencies are committing budget to these programs, additional funding for potential BMPs is not a current priority, but strongly viewed as complementary to educating the public and marketing for their customer's participation in all their programs. Collectively funded region wide radio announcement were first used in summer 2001 to link water and energy efficiency. New messages for water use efficiency were broadcast in the spring and autumn 2002.
- Build interagency cooperation between park and/or school districts and water agencies.
- Enhance customer relations, particularly with HOAs and overall community support through showing the value in ET based irrigation control systems through these outreach "showcase" sites in each agency's service area.
- Encourage eventual conversion to dedicated irrigation meters and water budget based billing systems.

Water Supply Reliability - This project will positively impact the Bay-Delta systems by increasing instream flows and reducing the overall reliance on the surface water supplies from the American and Sacramento Rivers upstream from the Bay-Delta. The RWA's and its member agencies' conservation efforts are an important part of a long-term, comprehensive effort to reduce pressure on the Bay-Delta system to meet regional and state-wide water needs. One of the fundamental objectives of the CALFED Bay-Delta program is to reduce the mismatch between Bay-Delta water supplies and the current and projected beneficial uses dependent on the Bay-Delta system. Water use efficiency projects are one of the cornerstone strategies the CALFED Bay-Delta program is deploying to achieve this objective. Actual incentives for the purchase of efficient irrigation system equipment will reduce the demand for a significant urban end-use of Bay-Delta water supplies. It is

anticipated that the 33 ET controllers to be installed under this project will result in water savings of approximately 444 acre-feet per year and a total of 13,316 acre-feet by 2015.

Water Quality - By reducing the amount of water use by customers in the agencies' water supply areas, other beneficial uses will be realized, such as providing flow to improve aquatic ecosystems and the habitat of many Federally listed species including: Delta Smelt, Splittail, Steelhead, Chinook salmon, fresh water shrimp, Coho salmon, and Steelhead along the American River and Lower Sacramento River watersheds.

Regional Partnerships - RWA is a joint powers agency of 18 water suppliers serving more than 1.2 million people in the greater Sacramento Region. The mission is to serve and represent regional water supply interests and assist RWA members with protecting and enhancing the reliability, availability, affordability and quality of water resources.

Urban Water Management Plans - This project is compatible with each of this project's cooperating agencies' 2000 UWMP and RWA's ongoing efforts to achieve greater water use efficiency. RWA's Board of Directors recognizes the importance of water management and conservation programs. RWA's has the general policy that states in part that RWA will support its member agencies in operating and maintaining each individual purveyor's water system in an efficient and economical manner and distribute and supply water as fairly and equitably as possible.

Water Use Efficiency Programs - A major component of RWA, the Regional Water Efficiency Program is designed to expand measures to help area water providers fulfill Water Forum best management practices (BMPs). The Regional Water Efficiency Program offers two tiers of services: Core activities serve as the fundamental building blocks necessary for implementing the BMPs and includes public information, school education, program marketing coordination, grant applications and technical assistance.

In addition, agencies can choose from subscription activities according to organizational and customer needs. These can include landscape irrigation surveys, marketing partnerships with landscape retailers, training for staff and customers, pilot projects, leak detection surveys and report preparation.

RWA and its member agencies are stakeholders in three major water management teams: Sacramento Area Water Forum (Water Forum), the American River Basin Cooperating Agencies (ARBCA), and the Sacramento Groundwater Authority (SGA). The project is consistent with the local water management plans including the SGA. This project is consistent with regional water management plans such as the ARBCA Regional Water Master Plan (RWMP) and Water Forum Agreement. This project is also consistent with statewide water management plans such as the California Urban Water Conservation Council's Memorandum of Understanding Regarding Urban Water Conservation in California.

All of the retail agencies that are external cooperating agencies are members of the Sacramento Water Forum.

In the year 2000, the Water Forum finalized the *Water Forum Agreement* (Agreement) which contains seven major elements to meet its objectives. Water conservation is the fifth major element in the Agreement. The water conservation portion of the Agreement describes each water purveyor's

commitments to implement BMPs. These BMPs were derived from the original MOU developed by the CUWCC, and then customized for the Water Forum conservation agreements prepared for the individual purveyors.

This project involves the implementation of urban water conservation best management practice (BMP) number 5, *Large Landscape Program*, as originally defined by the California Urban Water Conservation Council (CUWCC). The unpredictable water supply and ever increasing demand on California's complex water resources have resulted in a coordinated effort by the California Department of Water Resources (DWR), water utilities, environmental organizations, and other interested groups to develop a list of urban BMPs for conserving water. This consensus-building effort resulted in the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU), which formalizes an agreement to implement these BMPs and makes a cooperative effort to reduce the consumption of California's water resources.

One of the Water Forum Agreement BMPs, Large Landscape Audits and Incentives for Commercial, Industrial, Institutional (CII) and Irrigation Accounts, BMP 5, further defines the goals for large landscape audits beyond the definition within the CUWCC MOU. Thus, there is project is not considered an accelerated project as defined by DWR, but rather an extension to assist with implementation by the customer to achieve water savings. This project does not include implementing work considered a part of the requirements under the Water Forum Agreement BMP 5, Large Landscape Audits and Incentives for Commercial, Industrial, Institutional (CII) and Irrigation Accounts.

Currently, the retail water agencies within the Sacramento area are undergoing the conversion to water meters including dedicated irrigation meters. The conversion of these newly metered customers to a water billing rate structure based on their individual metered use from a flat-rate structure is causing these customers to take note of their water use, particularly higher summer water use for outdoor irrigation. While there is some incremental cost savings to the customer from water savings on their water bill, the benefits in immediate and verifiable installation of the rain sensor as an outdoor water conservation device largely accrue to the participating water agencies.

This project is cost effective relative to savings in production and operating costs as shown in Section F of this application. Even though this project proves to be locally cost effective, agencies need grants for seemingly cost effective projects. The substantiation that a project is cost effective is not enough to get project approval, since project managers and engineers must compete for available utility dollars. There is seldom enough money to serve all of the needs. Regulatory issues often take priority, such as: monitoring water quality for an ever-broadening list and lowering detectable levels of constituents of concern; meter installation commitments (in the Sacramento region); and keeping up with new building development. In the private sector, the competition might use return-on-investment analysis where paybacks of 1-2 years receive budget allocations, but paybacks of more than 5 years seldom are considered for funding. Water efficiency measures, while meaningful investments, often have much longer paybacks.

D-2 OUTREACH, COMMUNITY INVOLVEMENT, SUPPORT, OPPOSITION

This project is consistent with the California Urban Water Conservation Council's Memorandum of Understanding regarding water conservation. It is also consist with the Sacramento Water Forum

Agreement and RWA goals and objectives. A letter of support from the Sacramento Water Forum is included in Appendix H.

Outreach efforts support a regional-wide benefit, and will focus on particularly on those customers with the highest 20% water use. Primary written or telephone contact will be made by the individual water agency staff (or if requested of RWA staff or contractor) to the targeted customers. To the extent practical, the project will specifically target disadvantaged communities within El Dorado, Sacramento and Placer Counties. There are no tribal entities particularly impacted by this project.

Beginning in 2003, the Regional Water Authority Water Efficiency Program intends to develop a Landscape Advisory Committee. The committee will be modeled after those of the East Bay Municipal Water District and the Santa Clara Valley Water District. Probable members will represent landscape contractors, landscape designers, home owners associations, real estate developers, retailers of landscape plant products, nurseries, and land use permitting agencies. Their purpose will to promote cooperative approaches for better water efficiencies in landscape. The results of this collaboration will lend direction to future RWA landscape projects and their implementation. High on the list will be the implementation of landscape oriented grants projects.

Information on the results of this project will be disseminated through RWA's public outreach program. RWA is in the process of building a broad public information program and associated schools program, which assist its member agencies through providing materials, speakers, and outreach activities to the general public.

Outreach activities will also include water agency community newsletters publications sent to its customers and Web site development, public meetings, RWA participation at community events, multimedia campaigns, interagency partnerships, corporate environmental fairs, professional trade shows, water conservation workshops and seminars and a speakers bureau.

Summaries of the results and benefits of this project will be developed by RWA staff and made available to RWA agency membership and its member agency customers. Member agencies will advertise this program through additional means such as inserts will be included in billing mailer inserts for those customers with irrigation accounts, newsletters, and agency Web sites.

PART E—WATER USE EFFICIENCY IMPROVEMENTS AND OTHER BENEFITS

E-1 WATER USE EFFICIENCY IMPROVEMENTS

The sole objective of this project is an immediate improvement in outdoor water application efficiency. There are multiple expected beneficial outcomes of this project with the physical change of installing the ET controllers that will improve water use efficiency as a result. The value of those outcomes is both quantifiable and non-quantifiable. The quantifiable values of physical changes that will occur as a result of this project and the beneficiary of each benefit are listed in Table E-1.

Project outcomes and benefits will be shared among the project's beneficiaries and will directly and indirectly contribute to CALFED goals.

Table E-1. Quantifiable Physical Changes, Expected Benefits, and Beneficiaries

Physical change	Expected benefit	Beneficiary
Reduce water use on landscape irrigation by updating irrigation systems to better match applied water to evapotranspiration needs.	444 ac-ft/year 13,316 acre-feet for 10 year project life	CALFED goal to increase instream flows water in American and Sacramento River located upstream of the Bay-Delta system. Use local water supplies more efficiently
Water agencies in this project will save money on avoided costs of a new water supply	\$160/acre-foot of water saved	Water agency/customer

The direct, quantifiable improvements in water use efficiency are the avoided outdoor watering due to installation of 33 ET controllers at larger landscape sites within the Sacramento Metropolitan area. The area is predominately within Sunset Climate Zones 14 and 9 with evaporation rates averaging over 45.88 inches per between April and October, as illustrated above in Figure 6.

The estimated water savings is based on 2.69 AF/acre per year based on the following assumptions:

1. Water savings is the amount of applied water according to the basic water budget calculation as prescribed by BMP 5 (reference page 2-14, BMP 5 Handbook, CUWCC, April 1999). The following formula was used to calculate the amount of appropriately applied water for the irrigated area.

$$\text{Water Budget} = \text{landscape area} * (\text{ET}_o * \text{adjustment factor})$$

2. It is assumed that irrigation efficiency declines due to distribution uniformity being less than 100% (typically estimated at 80%). The value of irrigation efficiency (80%) is effectively the same as the value for the adjustment factor (80%) for the water budget calculation and cancel each other out, as assumed within under the Water Conservation in Landscaping Act (AB 325) Model Ordinance. Therefore, the basic equation of a water budget that does not adjust for a percent of ET_o , and assumes water budget is applied water at 100% ET_o . (Reference page C-1, BMP 5 Handbook, CUWCC, April 1999)

3. ET controller managed irrigation applications are assumed to meet plant needs at least as well as the recommended month-to-month average year water budgets in the audits described in Appendix A, if not better.
4. ET controllers will provide irrigation scheduling incorporating actual ET rates and rainfall. Effective rainfall is not accounted for in water budget calculations.
5. As provided in Table E-2 below, the Water Budget Survey audits for 10 parks in RWA member agency service areas showed the potential for average gross water savings in excess of 40% if the recommended month-to-month water budgets were used versus actual year 2001 irrigation scheduling. Copies of the completed landscape audit reports for each of the 10 parks audited to date in the San Juan Water District service area are provided in Appendix A.
6. The projected water savings were based on these audit values shown in Table E-2. The water budgets were calculated using known irrigation system performance for each park.
7. Net water savings were assumed to be 85% of gross savings for reasons discussed under Section F-1. Average annual net water savings per irrigable area is 2.69 AF/acre/year.

Table E-2. Water Savings from Completed Water Budget Survey Results

Site Name	Gross Area (ac)	Net Irrig. Area (ac)	Historical Usage (CCF)	Annual Excess (CCF)	Annual Excess (AF)	Gross % Savings	Est. Net Water Savings* (AF)
CHWD Madera Park	15.24	12.8	10,775	359	25	3.33%	21.0
CHWD Rusch Park	51.05	36.8	44,117	13,990	101	31.71%	86.1
FOWD Phoenix Park	29	27.4	46,169	23,469	106	50.83%	90.1
FOWD Plaza Park	2.5	1.8	3,507	1,828	8	52.12%	6.8
OVWC Almond Park	10.5	9	13,148	5,346	30	40.66%	25.7
OVWC OV Comm Park	13.8	7.7	11,255	5,636	26	50.08%	22.0
OVWC Pecan Park	10.1	5.4	7,565	3,105	17	41.04%	14.8
SJWD Beal's Point State Park	6	5	7,803	3,695	18	47.35%	15.2
SJWD Douglas Ranch Park	4.3	3.1	4,795	2,028	11	42.29%	9.4
SJWD Granite Bay State Park	4	2.7	3,970	1,708	9	43.02%	7.7
SJWD Treelake Park	7	6	8,959	3,984	21	44.47%	17.5
Total/Average		117.7				40.63%	316
Total Annual Net Savings per Irrigated Acre (AF/ac/yr)							2.69

*Net water savings estimated at 85% of gross savings

8. The proposed project assumes approximately one 25 acre site and two 10 acres sites, or effectively 45 net irrigated acres, per retrofitted ET controllers in each of 11 water agency service areas for a total irrigated area retrofitted of 495 acres.
9. The total avoided water applied annually based on the above assumptions is 444 acre-feet. This project will result in total water savings of 13,316 ac-ft over a 10-year useful life. A 10-

year useful life is based on product specifications for ET controllers, and additional experience in City of Roseville, City of Calgary and other water agencies.

E-2 OTHER PROJECT BENEFITS

Non-quantifiable project outcomes and benefits are listed and described in Table E-3. It is indicated how each non-quantified outcome or benefit will be shared among the project beneficiaries. The non-quantified outcomes expected to directly or indirectly contribute to CALFED goals are also identified and delineated.

Table E-3. Non-Quantifiable Benefits

Physical change	Expected benefit	Beneficiary
Reduce consumptive water use during summer peak demand period for irrigation by watering according to efficient evapotranspiration rates with the upgraded equipment	Improved Bay-Delta ecosystem	CALFED goal
Less water pumped from wells and less water diverted from the Lower American River. In addition, more water may be available for hydropower generation at Folsom Dam and Natomas Dam.	Energy savings from reduced pumping and energy generation from hydropower production.	USBR, and local water supplier participants of RWA
Appropriate amounts of applied water improve condition of landscapes:	More attractive landscapes Improved condition and utility of sports fields	Customers, regional residents, and visitors
Reduced runoff to adjacent roads	Lower road maintenance cost	Community public works departments

PART F – ECONOMIC JUSTIFICATION: BENEFITS TO COSTS

This section includes a breakdown and justification of the project budget and cost sharing information. Also described and analyzed are the benefits and costs of this project. Tables within this Section F, particularly the summary of benefits and cost analysis in Table F-2, are provided in lieu of the DWR Benefit Cost Summary Tables provided in the grant application package.

F-1 NET WATER SAVINGS

Details of justification for the estimated annual net water savings of 2.69 AF per acre is provided above in Section E-1. It is expected that net water savings are solely due to irrigation cycles matched to ET and incorporating rainfall on a real time basis. The annual net water savings for the program is on average 13,312 ac-ft over a 10-year useful life.

Embedded in the assumptions of water savings estimates is an overall assumption that these systems when converted to efficient irrigation systems will operate at 100% ETo, when actual applied water may be less assuming other site improvements are made at the same time of the ET controller upgrade. It is also assumed that over applied water that otherwise evaporate or evapotranspire, is the basis of the wasted water and is 85% accountable for net water savings.

It is assumed that the new systems are efficient irrigation systems designs with correctly programmed irrigation controller schedules and 80% uniformity in application, which is expected for maintaining a landscape in good condition. Any additional savings due to reductions in over-watering is assumed to be run-off and is not counted for as part of net water savings due to the stormwater drainage systems return flows to the American and Sacramento Rivers being available for reuse. To account for the on-site excess irrigation that remains non-quantifiable but may drain to the storm drainage system around the site parameter, an estimated 15 percent reduction in net water savings has been assumed.

Unlike a residential development, these school or park sites have minimally developed site drainage systems that connect to the municipal storm drainage systems that discharge to the American River or Sacramento Rivers. It is assumed that the unaccounted for 15% excess applied water may result in on-site ponding or shallow percolation within the root zone likely does not reach the underlying confined aquifer.

The assumption for a 15 percent reduction of gross water savings to estimated net water savings is tested in the economic uncertainty analysis presented in Section F-3.1. Additional background information based on the projected net water savings is provided following Section F with summary tables that breakdown the estimated benefits and costs in additional detail.

F-2 PROJECT BUDGET AND BUDGET JUSTIFICATION

Table F-1 presents a detailed estimated budget that includes relevant line items for capital outlay project proposals and justification of each line item. This table also indicates the amount of cost sharing for each element.

Table F-1. Detailed Budget – Capital Outlay Project Proposal

Item	Justification	Labor		Other direct costs, dollars	Total, dollars	RWA & Park Districts portion	Prop 13 portion
		Hours	Dollars				
Land Purchase /Easement	Not applicable					0	0
Planning/Design/Engineering	Not applicable					0	0
Materials/Installation	\$1,700 for 22 medium parks and \$4,500 for 11 large parks		87,000		87,000	87,000	0
Structures	Not applicable					0	0
Equipment Purchases/Rentals	Estimated cost for ET Controllers is \$38,600for 22 medium 10 acre parks and \$59,000 for 11 large >25 acre parks (less labor costs above).			1,411,200	1,411,200	0	1,411,200
Environmental Mitigation/ Enhancement	Not applicable					0	0
Construction/Administration/ Overhead	5% for RWA administration and overhead on agency, and park district coordination.			80,000	80,000	0	80,000
Project/Legal/License Fees	Not applicable					0	0
Contingency	To ensure sufficient funding			166,700	166,700	0	166,700
Other	Not applicable					0	0
Project Total					1,744,900	87,000	1,657,900

F.2.1 Cost Sharing

RWA's participating agencies are providing 5% cost sharing and RWA is thus requesting 95 percent in funding (\$1,657,900) from the Proposition 13 Urban Water Conservation Program. Given that this is a project solely funded by the participating agency and site owners contributions (\$87,000) and no additional cost recovery mechanisms are available for RWA to cover the eleven (11) member agencies committed to this program. RWA requests a \$166,700 contingency to ensure that funding available over the 12-month periods for the installation program is sufficient given the contractual arrangements required by RWA bylaws, a Joint Powers Authority. Grant funded projects are structured on a subscription bases by the participating agencies. RWA bylaws prohibit the encumbrance of no-participants (even though they may be RWA members) with liabilities of subscription activities. RWA will make every effort to maintain the budget within the requested \$1,657,900.

There are no additional funding commitments or cost sharing agreements for this project. The previously mentioned landscape irrigation audit program is a separate subscription activity, with separate funding that cannot be used in this project.

F-3 ECONOMIC EFFICIENCY

This section includes an assessment that summarizes the costs and benefits of the proposed project. The major analysis assumptions are listed and explained. This section also shows the present value of the quantified costs and benefits to the applicant, CALFED, and other parties affected by the project and summarizes non-quantified costs and benefits to the applicant, CALFED, and other

parties affected by the project. In addition, a break-even analyses determining the sensitivity of the project's water savings assumptions to cost effectiveness is also provided in Section F-3.1 below.

This project is locally cost effective to the RWA. Based on the simplified benefit-cost ratio assessment in Table F-2, using project benefits and costs, the project has a benefit to cost ratio of 1.1. Since this number is greater than one, it indicates an economically justifiable project.

Below is a list and explanation of all the quantifiable benefits/costs assumptions and methodologies.

An equation for ET controller costs per net irrigated acre was developed based on equipment and labor cost estimates provided by manufacturers and contractors for a large and medium sized park. This equation was applied to derive costs for the large and medium parks proposed for this project. The cost curve shown below in Figure 8 is based on associated cost estimates for two park audit reports for Phoenix Park and Orangevale Community Park provided by each manufacturer's representatives for the Motorola Irrinet and Rainbird Maxicom² systems. These cost estimates are provided in Appendix E.

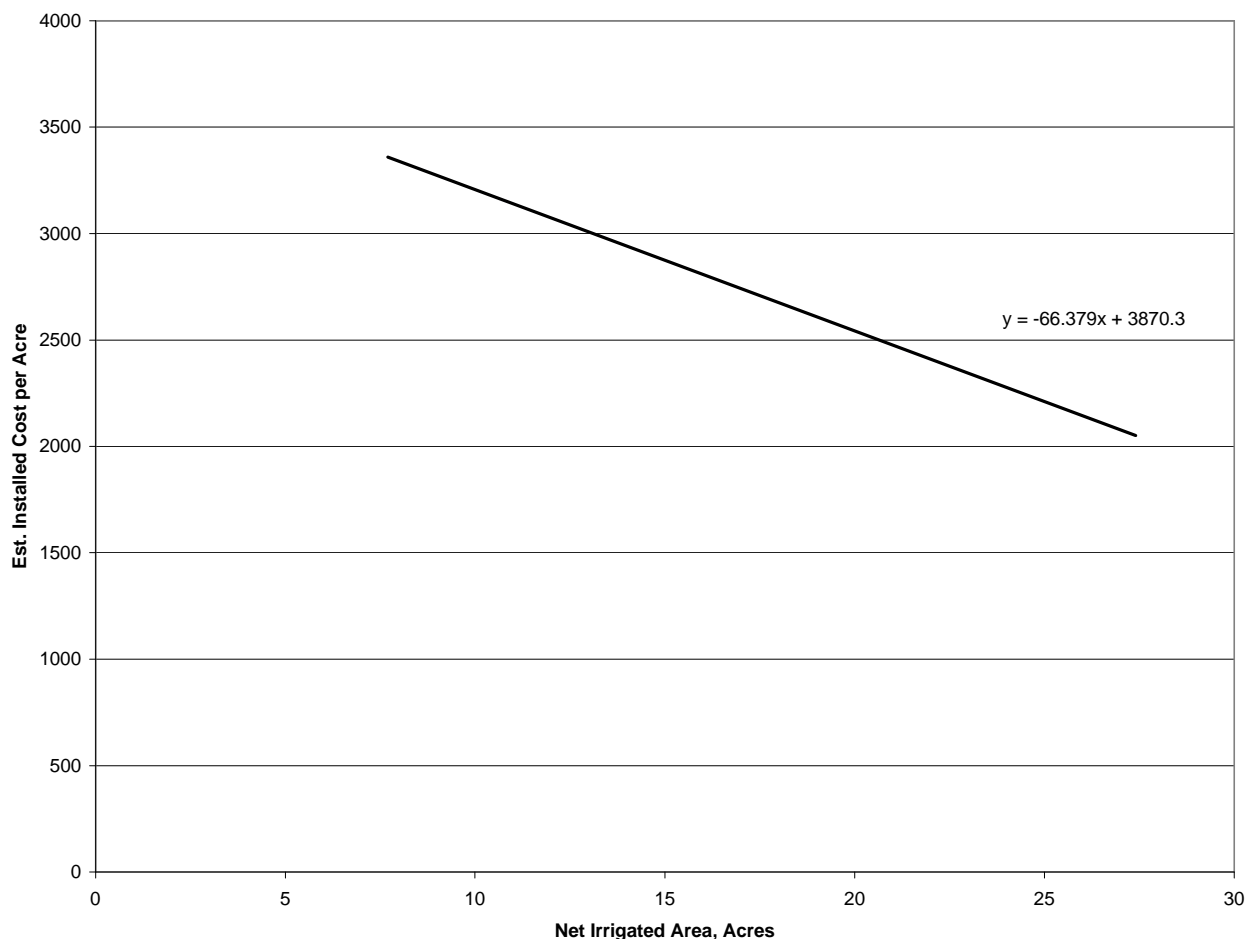


Figure 8. Cost Function based on Estimated Equipment and Installation Cost per Irrigated Acre

The following assumptions were also used in determining associated project costs:

1. The proposed project assumes approximately one 25 acre site and two 10 acres sites, or effectively 45 net irrigated acres, per retrofitted ET controllers in each of 11 water agency service areas for a total irrigated area retrofitted of 495 acres.
2. Estimated cost for a 25 acre site is \$55,250 and for a 10 acre site is \$32,060. The estimated cost of installation is based on the cost function:

$$\text{Estimated Installation Cost} = \text{Net Irrigated Area} * (3870 - (66.4 * \text{Net Irrigated Area}))$$

3. Costs have been conservatively increased by 15 percent for additional actual installer costs above the estimated manufacturer costs.
4. The administration cost per site is assumed to be 5 percent of total project costs. This is the combined cost for RWA and its eleven participating member agencies to administer the installation per each large landscape site. The cost used in the analysis does not include the contingency.
5. The average total net water savings is estimated as 2.69 acre-feet per acre annually, as described in Section E-1 above. Average ETo measured from the Fair Oaks CIMIS station is 45.88 inches for the April through October period. It is assumed that the irrigable area for these systems is based on available information from water suppliers as summarized in the table of Medium and Large Landscape Sites Summary Table provided in Appendix A.
6. The effective life of the installation is 10 years. Water savings from installations are assumed to be 100 percent effective for the first 5 years from the time of the installation. Water savings are estimated to expire in 10th year, assuming routine operation and maintenance although it is estimated that additional water savings can be counted for up to 15 years, based on "Efficient Landscapes" (Tom Ash, Irvine Ranch Water District, Energy 2002 Conference Proceedings) as documented in Appendix G.
7. All quantified benefits and costs are expressed in year 2002 dollars using a 6.00 percent discount rate as required by DWR Urban WUE Grant Application Package.
8. The weighted value of conserved water for the water agencies under RWA in this project is \$160/ac-ft. This cost is based on the estimated surface water purchase costs and groundwater supply costs for the Sacramento Region presented in the DWR Groundwater Storage Construction Grant Application prepared for Sacramento Ground Water Association, December 2001. Justification for the avoided cost of water supply sources is documented in Appendix G.

An economic analysis of this project, based on the assumptions listed above is shown in Table F-3. Tables within this Section F, particularly the summary of benefits and cost analysis in Table F-2, are provided in lieu of the DWR Benefit Cost Summary Tables provided in the grant application package. A summary of the non-quantified costs and benefits to the applicant, each project beneficiary, and CALFED are summarized in Table F-4.

Table F-3. Summary Economic Analysis

List of Assumptions

No.	Assumption
1	Value of conserved water (\$/AF) = 160
2	Discount rate (real) = 6.00%
3	Water saved per year per acre (ac-ft/yr) = 2.69
4	Average large lot size (acres) = 25.00
5	Average medium lot size (acres) = 10.00
6	Cost per large landscape site per acre (\$/acre) = 2,360
7	Cost per medium landscape site per acre (\$/acre) = 3,864
8	Administrative Cost per site (%) = 5%
9	Number of large landscape ET controllers installed in 2004 = 3
10	Number of medium landscape ET controllers installed in 2004 = 7
11	Number of large landscape ET controllers installed in 2004 = 5
12	Number of medium landscape ET controllers installed in 2005 = 10
13	Number of large landscape ET controllers installed in 2006 = 2
14	Number of medium landscape ET controllers installed in 2006 = 6

Calendar Year	ET Controllers Installed on Large sites	ET Controllers Installed on Medium sites	Incremental Water Savings (AF/yr)	Annual Water Savings (AF/yr)	Benefits (\$)					Costs (\$)		
					Avoided Capital Costs	Avoided Variable Costs	Avoided Purchase Costs	Total Undiscounted Benefits	Total Discounted Benefits	Capital Outlay Costs	Total Undiscounted Costs	Total Discounted Costs
2004	3	6	363	363	0	58,104	0	58,104	54,815	429,266	429,266	404,968
2005	6	10	673	1,036	0	165,704	0	165,704	147,476	777,389	777,389	691,873
2006	2	6	296	1,332	0	213,048	0	213,048	178,879	367,322	367,322	308,410
2007			0	1,332	0	213,048	0	213,048	168,754	0	0	0
2008			0	1,332	0	213,048	0	213,048	159,202	0	0	0
2009			0	1,332	0	213,048	0	213,048	150,190	0	0	0
2010			0	1,332	0	213,048	0	213,048	141,689	0	0	0
2011			0	1,332	0	213,048	0	213,048	133,669	0	0	0
2012			0	1,332	0	213,048	0	213,048	126,103	0	0	0
2013			0	1,332	0	213,048	0	213,048	118,965	0	0	0
2014			0	968	0	154,944	0	154,944	81,623	0	0	0
2015			0	296	0	47,344	0	47,344	23,529	0	0	0
2016			0	0	0	0	0	0	0	0	0	0
2017			0	0	0	0	0	0	0	0	0	0
2018			0	0	0	0	0	0	0	0	0	0
2019			0	0	0	0	0	0	0	0	0	0
2020			0	0	0	0	0	0	0	0	0	0
2021			0	0	0	0	0	0	0	0	0	0
2022			0	0	0	0	0	0	0	0	0	0
2023			0	0	0	0	0	0	0	0	0	0
2024			0	0	0	0	0	0	0	0	0	0
2025			0	0	0	0	0	0	0	0	0	0
Totals:	11	22	1,332	13,316	0	2,130,480	0	2,130,480	1,484,893	1,573,976	1,573,976	1,405,251

(1) 100 percent water efficiency during life of ET controllers is assumed to be 10 years, then water savings conservatively assume to end.

(2) Cost does not include contingency.

(3) Total est. cost of 25 acre site = \$59,000

(4) Total est. cost of 10 acre site = \$38,600

(5) Reference documentation for Motorola and Rain Bird manufactureres provided cost estimates provided in Appendix E

Benefit cost ration: 1.1

Table F-4. Summary of Non-quantifiable Costs and Benefits

	Non-quantified costs	Non-quantified benefits
RWA Agencies	None	<ul style="list-style-type: none"> • Increased water supply reliability
DWR		<ul style="list-style-type: none"> •
CALFED	None	<ul style="list-style-type: none"> • Increased instream flows during summer peak irrigation season and dry-years • Increased water supply reliability to water users while at the same time assuring the availability of sufficient water to meet fishery protection and restoration recovery needs • More water for Bay-Delta water quality improvements and aquatic ecosystems
Energy provider	None	<ul style="list-style-type: none"> • Energy savings as a result of less water pumped into the system.
Groundwater Basin	None	<ul style="list-style-type: none"> • Decreased overdraft and improved water quality • Increased flexibility in dry-year water supply options
American River Ecosystem	None	<ul style="list-style-type: none"> • Improved aquatic and terrestrial habitat in the American River watershed • More water available to meet fishery protection and restoration recovery near-term needs

Section F-3.1. Analysis of Uncertainty

This section addresses the uncertainty analyses performed for this project. The sensitivities of the cost effectiveness analysis to modifications of the assumptions and resulting effect on the Benefit/Cost ratio are presented.

Because the avoided cost of water, average annual net water savings, installed cost of the ET controller per acre (derived cost function as described above), and administrative costs constitute a potential source of uncertainty in cost-effectiveness analysis, a sensitivity analysis was conducted to test results over a range of values. While the average annual net water savings per irrigated acre acted as a variable, the other variables were held constant. Likewise, while the each value acted as a variable, the other values were held constant, such as the annual net water savings at 2.69 ac-ft/acre/year was reduced to 2.42 ac-ft/acre/year before the project was not locally cost-effective.

As shown in Table F-5, the analysis is not sensitive (project remains cost effective) with the following modifications in assumptions:

- decrease in applied net water savings per irrigated area could be reduced by an additional 10%,
- decrease of avoided cost of water supply by approximately 10%,
- increase by 20% in costs for ET controller and labor costs (in additional to 15% markup) would still produce a cost effective project, or
- increase in administrative costs by 8%.

The economic analysis spreadsheets for each of these analyses is provided in Appendix I of this application.

Table F-5. Results of Economic Uncertainty Analysis

Variable ^a	High/Low		Assumed		Break-even value ^b	
	Value	B/C ratio	Value	B/C ratio	Value	B/C ratio
Net water savings per acre per year ^c (ac-ft/ac/yr)	3.00	1.2	2.69	1.1	2.42	1.0
Avoided cost of water supply vendibility	198	1.3	161	1.1	144	1.0
Installed cost of ET controller large site	1,800	1.2	2,360	1.1	2,800	1.0
Installed cost of ET controller medium site	3,000	1.2	3,864	1.1	4,500	1.0
Administration Cost	0%	1.1	5%	1.1	8%	1.0

^a All other assumptions except for variable remain constant.

^b Break-even value is that variable value which causes the benefit to cost ratio to equal 1.0.

^c Break-even value for the Average Water Applied represents an additional 10% reduction in gross water savings (or 25% total reduction) which illustrates a net water savings of 2.42 ac-ft/ac/year still maintains a cost effective project outcome.

APPENDIX A

PRELIMINARY LIST OF SITES & REPORTS FROM COMPLETED LANDSCAPE AUDITS

- Completed Landscape Audit Reports in Sacramento Regional area
- Preliminary List of Medium and Large Landscape Sites Summary Table

APPENDIX B

PROJECT MANAGERS RESUMES

APPENDIX C

LETTERS OF COMMITMENT

APPENDIX D

ET CONTROLLER EQUIPMENT SPECIFICATIONS

APPENDIX E

ET CONTROLLER EQUIPMENT & LABOR COST ESTIMATES

- **Motorola IrriNet Controller System – Phil Geibel, Sales Representative**
- **Rainbird Maxicom² System – Dave Fulton, Maxicom Sales Specialist**

APPENDIX F

DATA REPORTS AND CASE STUDIES

- **Historical Metered Data for Retrofitted Parks in City of Roseville**
- **Case Study – City of Calgary**

APPENDIX G

BACKGROUND INFORMATION ON DATA ASSUMPTIONS

- **Avoided Cost of Water Supply Source Justification**
- **ET Controller Useful Life Justification, Efficient Landscapes, Energy 2002 Conference Proceedings, Tom Ash, Irvine Ranch Water District**

APPENDIX H

LETTERS OF SUPPORT

APPENDIX I

RESULTS ECONOMIC UNCERTAINTY ANALYSIS
